

## MODERN DEVELOPMENTS IN FOURIER ANALYSIS: PROPOSED PROJECTS

For the assessment of the course, students are asked to work in small groups to study a subject related to the course material. Each group is to give a 50 minute presentation and write a short report on their chosen topic.

Below is a list of suggested topics. Students may wish to propose their own project, in which case they should contact me with their proposal.

- Multilinear Kakeya via induction-on-scale.
- The local smoothing conjecture vs the Bochner–Riesz and maximal Bochner–Riesz conjectures.
- Maximal Bochner–Riesz in the plane.
- Background on the Vinogradov mean value theorem and its applications to the Waring problem and the zero-free regions of the zeta function.
- Decoupling for the paraboloid in dimensions  $n \geq 2$ .
- Applications of decoupling to Strichartz estimates for Schrödinger equations on tori.
- Applications of decoupling to  $L^p$ -bounds for eigenfunctions on the torus. Improvements via the circle method.
- Local smoothing via decoupling.
- Local smoothing and Bourgain’s circular maximal function.
- $L^p$ -Sobolev improving for averages along curves in  $\mathbb{R}^3$ .